

REMARKS

Claims 1-19 and 21-36 were previously presented in the above-identified application.

Upon entry of this amendment, which amends claims 1, 12, 13, 16 and 22, and adds claim 37-49, claims 1-19 and 21-49 remain pending. The Applicant respectfully requests reconsideration of the rejections in view of the following remarks. No new matter has been added with this amendment.

Although the Advisory Action dated January 30, 2004 indicated that the Applicant's previous response did not place the subject application in condition for allowance, each 102(b) rejection based on U.S. Patent No. 4,806,815 ("Honma") has been withdrawn.

Section 102(e): Gummin.

Previously presented claim 1 and dependent claims 2-19 have been rejected under 35 U.S.C. §102(e) as being anticipated also by U.S. Patent No. 6,326,707 ("Gummin"). This position has been reiterated in the Advisory Action. Applicant traverses this rejection for at least the reasons that follow.

Claim 1.

Applicant respectfully submits that Gummin fails to disclose each of the elements set forth in amended claim 1. For example, amended claim 1 now recites: an SMA actuator comprising: "a heat sink having a first surface and a second surface . . . where at least the central portion . . . is in close proximity to the first surface . . . , and an end portion . . . is proximate to the second surface . . . "

By contrast, Gummin at most teaches a housing having a number of passages for extending SMA wires therethrough, where each passage is disclosed only to have a smooth-walled hole. As indicated in FIGs. 1 and 2, and from col. 5, lines 61-67 to col. 6, line 1, Gummin provides a plurality of passages 43 extending through housing 41 to receive SMA wires 36A-36D. Further, Gummin teaches that passages 43, which naturally are defined by the surfaces of housing 41, have been dimensioned only to provide clearance to eliminate contact

with housing 41. Nowhere does Gummin teach or suggest that passages 43 and the surfaces of housing 41 are dimensioned for any other purpose. And since Gummin expressed no other purpose for dimensioning the passages 43 as multiple surfaces, this cited reference cannot be said to disclosure or even hint that the surfaces of housing 41 are anything other than a single surface. So, Gummin fails to either inherently or explicitly teach, or even suggest, that an SMA wire includes “at least [a] central portion . . . [that] is in close proximity to the first surface . . . , and an end portion . . . is proximate to the second surface . . . ,” as recited in claim 1. Therefore, amended claim 1 is distinguishable from the teachings of Gummin.

So, for at least the foregoing reasons, Applicant submits that claim 1 is now in condition for allowance. Claims 2-19 depend from allowable independent claim 1 and thus are patentable for at least the same reasons. Therefore, withdrawal of the §102(e) rejection in connection with these claims is respectfully requested.

Section 102(e): MacGregor.

Previously presented claim 1 and dependent claims 2-19 have been rejected under 35 U.S.C. §102(e) as being anticipated also by U.S. Patent No. 6,574,958 (“MacGregor”). This position has been reiterated in the Advisory Action. Applicant traverses this rejection for at least the reasons that follow.

Claim 1.

Applicant submits that MacGregor also fails to disclose each of the elements set forth in amended claim 1. As just one example, amended claim 1 now recites: an SMA actuator comprising: “a heat sink having a first surface and a second surface . . . where at least the central portion . . . is in close proximity to the first surface . . . , and an end portion . . . is proximate to the second surface”

By contrast, MacGregor at most teaches that either a rod or a tube (i.e., hollowed rod) over which a SMA wire encircles can operate to some degree as a “heat sink.” As indicated in FIGs. 9 and 10, and col. 12, lines 22-25 and lines 35-37, MacGregor provides “two parallel hollow low-friction non-conductive tubes or rods 901 and 902 with an SMA wire 910 wrapped

around them as if they were pulleys. . . . These not only can withstand high temperatures, but also conduct heat efficiently, so that the tubes/rods also act as heat sinks for the SMA wire, further improving the responsiveness of the resulting actuator. The result is an actuator that is smaller and much more responsive than could be achieved using conventional methods, but which avoids the mechanical complexity of pulleys.” See col. 11, line 67 to col. 12, lines 1-3, and lines 22-28 (emphasis added). As such, MacGregor neither teaches nor suggests that pulley-like tubes or rods 901 and 902 would have any surface other than a single surface (e.g., smooth surface) over which SMA wires can traverse. So, MacGregor cannot be said to teach or suggest an SMA wire “where at least [a] central portion . . . is in close proximity to the first surface . . . , and an end portion . . . is proximate to the second surface . . . ,” as recited in claim 1. Therefore, amended claim 1 is distinguishable from the teachings of MacGregor.

So, for at least the foregoing reasons, Applicant submits that claim 1 is now in condition for allowance. Claims 2-19 depend from allowable independent claim 1 and thus are patentable for at least the same reasons. Therefore, withdrawal of the §102(e) rejection in connection with these claims is respectfully requested.

New claim 37.

Applicant submits that since new claim 37 depends from allowable claim 1, it also is distinguishable from both Gummin and MacGregor. So, claim 37 is also patentable over the cited references.

New claims 38-49.

Applicant submits that new claims 38-43 are also patentable over the cited references for at least the following reasons. First, new claim 38 recites that each member includes “an edge parallel to the long axis, the edge having at least one end edge surface and a central edge surface, where at least a central wire portion of the SMA is at a first distance to the central edge surface and an end portion the SMA wire is at a second distance to the least one end edge surface.” No cited reference appears to teach or suggest each of these elements. Second, claim 38 recites that “the central edge surface operating as a heat sink to primarily effectuate heat transfer from the

central wire portion, and the second distance locates . . . the end portion of the SMA wire so to primarily effectuate conductive heat transfer into an attachment point of one member” Again, none of the cited reference appears to teach or suggest each of these elements. Third, claim 38 recites that “the second distance . . . is a function of at least a dimension of the SMA wire, and a surface area of the end edge surface.” These elements are neither present nor suggested by the cited references. Fourth, claim 38 recites that “the end edge surface is configured to thereby increase the operating length of the SMA wire.” Each of the cited references lacks these elements.

Because none of the cited references teach each of the aforementioned elements, the Applicant respectfully submits that new claim 38 is patentable. And since claims 39-43 depend from patentable claim 38, these claims are patentable for at least the same reasons. Independent claim 44 is patentable for similar reasons enumerated above in relation to new, independent claim 38. And as such, claim 44 is also patentable. With claims 45-49 depending from allowable independent claim 44, these claims are thus patentable for at least the same reasons.

Section 102(b): Jacob.

Previously presented claim 22, 27, and 33 and respective dependent claims 23-26, 28-32, and 34-36 were held rejected under 35 U.S.C. §102(b) as being anticipated also by U.S. Patent No. 4,027,953 (“Jacob”). This position has been reiterated in the Advisory Action. Applicant continues to traverse this rejection for at least the reasons that follow.

Claims 22, 27 and 33.

Applicant submits that Jacob fails to disclose each of the elements set forth in independent claims 22, 27 and 33, as amended or as previously presented. For example, amended claim 22 now recites a shape memory alloy actuator “comprising . . . a shape memory alloy wire having a first end . . . is attached to the rigid planar elongate member proximate to and external to the recess.” As another example, previously presented claim 27 recites a sliding plane shape memory alloy actuator comprising “a first heat transfer mechanism dominat[ing] the heat transfer between the central portion of the shape memory alloy wire and the rigid member;

and a second different heat transfer mechanism dominat[ing]the heat transfer between the portion of the rigid member having the recess formed therein and the portion of the shape memory alloy wire proximate to the portion of the rigid member having a recess formed therein.” And as yet another example, previously presented claim 33 recites a sliding plane shape memory alloy actuator “wherein, the heat transfer between [a] rigid member and [a] shape memory alloy wire is related to [a] spacing between the rigid member and the shape memory alloy wire . . . a first spacing in the central portion . . . and the shape memory alloy wire is spaced from the rigid member at a second spacing at the ends . . .”

By contrast, Jacob at most teaches a pair of bimetal elements that expand when heated and contract when cooled. In particular, Jacob teaches that each bimetal element is “formed having a generally C-shaped configuration with an upright portion 24 and a pair of elongated transverse extensions 26.” See col. 2, lines 36-39. As the Jacob’s bimetal elements are “C-shaped” and are composed of a “pair of extensions,” these bimetal elements cannot be said to be “wires.” Further, the bimetal elements taught by Jacob cannot be equated to SMA wires of the subject application. For example, Jacob teaches that each of bimetal elements 20, 22 is composed of two components, each of which “has a different coefficient of expansion.” See col. 1, lines 53-54; col. 3, lines 21-24. As is well-known in the art, bimetal elements such as Jacob’s bimetal elements 20, 22 are commonly formed by bonding two dissimilar metals together (e.g., back-to-back). So, when the two bonded components are heated, one metal component expands at rate faster than the other metal component. This causes the faster expanding metal component to bend over onto the other metal component. This is the characteristic of bimetals on which Jacob’s bimetal elements relies. By contrast, an SMA wire is an alloy (i.e., SMA means “shape memory alloy”). As such, two bonded metallic components cannot be equated to an alloy constituting an SMA wire of the subject application. So, because Jacob fails to teach or suggest an SMA as recited in any claims 22, 27 and 33, these claims are distinguishable from the teachings of Jacob.

So, for at least the foregoing reasons, Applicant submits that independent claims 22, 27, and 33 are now in condition for allowance. Claims 23-26, 28-32, and 34-36 depend respectively from independent claims 22, 27, and 33 and thus are patentable for at least the same reasons.

Therefore, withdrawal of the §102(b) rejection in connection with these claims is respectfully requested.

Section 103(a): Gummin, Jacob and other cited art.

Previously presented dependent claims 4-5, 6-13, 16-19 were previously rejected under 35 U.S.C. §103(a) as being nonobvious in combination with Gummin and one or more other cited references. As these claims depend from allowable claim 1, these too are allowable for at least the same reasons claim 1 is patentable, as described above. Claims 34-35 were previously rejected under 35 U.S.C. §103(a) as being nonobvious in combination with Jacob and what is purportedly known by persons of ordinary skill in the art. But as claims 34-35 depend from allowable claim 33, these claims are also patentable for at least the same reasons described above. Therefore, withdrawal of the §103(a) rejection in connection with these claims is respectfully requested.

CONCLUSION

Applicant maintains that the "holes" disclosed by Gummin are unlike "recesses," as described in the subject application, and that the "bimetal elements" of Jacob are unlike "SMA wires." But Applicant now amends the subject application for purposes of clarifying the claimed subject matter and expediting prosecution toward an early allowance. Therefore, Applicant reserves the right to reintroduce claims as previously filed. Should the Applicant choose not to reintroduce those¹ claims, Applicant does not imply (and it should not be inferred) that the presently amended claim scope is the broadest to which it is entitled.

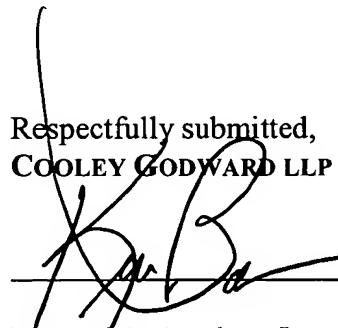
In sum, all of the independent claims and their associated dependent claims should now be in a condition for allowance, which is respectfully solicited. If the Examiner believes that any of the claims are not in a condition for allowance, the Examiner is encouraged to contact the undersigned to resolve any outstanding issues.

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Cooley Godward LLP
ATTN: Patent Group
Five Palo Alto Square
3000 El Camino Real
Palo Alto, CA 94306-2155
Tel: (650) 843-5000
Fax: (650) 857-0663

By:

Respectfully submitted,
COOLEY GODWARD LLP


Kenneth R. Backus, Jr.
Reg. No. 48,861